

BE for CE-Level Decision Template

NFS Unit & District: 0204-08

Project Name: Clear Fork, East Muddy Creek; Cutthroat Trout Restoration Project

Date: 06-28-2021

Section I – Screening Tables

Species List Analyzed:

R2 RFSS List Date: ☒ 12/2018 (most recent [R2 FSM 2670](#)); ☐ - Other Date

Date TEP list acquired from [IPaC](#) 12/10/2019 12/10/2019

Introduction:

The purpose of this document is to examine the possible effects the Clear Fork, East Muddy Creek; Cutthroat Trout Restoration Project may have on any of the federally listed terrestrial wildlife species and R-02 sensitive species, which occur in the project area.

The objective of this project is to place a fish barrier in the East Muddy Creek tributary to Clear Fork Creek. The location of the barrier is approximately 25 feet off Clear Fork road. Most of the stream is located within the Clear Fork Colorado Roadless Area, however, the barrier and all construction activities will occur outside of the roadless area. No new roads will be established. An excavator and other equipment will be used to prep the site, move materials, backfill, and dewater during construction. The excavator will travel approximately 25 feet cross country from the Administration Road to the barrier location using the path of least resistance. Once the site is prepped, a concrete structure with concrete wing walls and foundation will be poured in place. To get the concrete placed in forms, a large boom will likely be used. The goal is to get the project done with as little ground disturbance as possible. Any areas that are incidentally disturbed because of the construction will be rehabbed and seeded with native seed as necessary.

The fish barrier is needed to keep non-native fish from predating on and out competing the native green lineage Cutthroat Trout, *Oncorhynchus clarkii* in the area. The fish barrier will also aid in any future management strategies involving the pond and waterways up stream.

Once the fish barrier is in place Colorado Parks and Wildlife (CPW), the Forest Service and their partners will remove non-native fishes using an approved piscicide in accordance with label instructions from the stream and its tributaries (Rock Creek, North and South Twin Creeks, Second Creek and Basin Creek). Several of the smaller tributaries have natural barriers currently preventing brook trout invasion and no chemical treatment will occur above such barriers. After the treatment, these remaining native populations will serve as source populations to repatriate (repopulate) the main stem of Clear Fork.

Two decontamination stations using potassium permanganate will be located downstream of the treatment area to neutralize the rotenone and prevent it from impacting fish and other species downstream of the fish barrier. One station will be located just below the barrier and the second will be located approximately ~~2.1~~ miles further downstream.

Piscicides, including rotenone, are effective at removing fish from habitats where nets, electrofishing, angling, traps, or other mechanical methods are impractical or ineffective. Piscicides are also non-specific and can impact all gill-breathing organisms, including larval amphibians and macroinvertebrates (Skaar et. al., 2017). Treatments in streams and rivers also cause significant loss of invertebrate fauna

Formatted: Not Highlight

Biological Evaluation for Categorical Exclusion

but effects are usually most noticeable close to rotenone application stations. Not all invertebrate losses in stream treatments are due to the death of animals because rotenone also causes increases in invertebrate drift downstream (Morrison 1977).

Rotenone interrupts aerobic cellular respiration by blocking electron transport in mitochondria which prevents the availability of oxygen for cellular respiration. In other words, rotenone inhibits a biochemical process at the cellular level, making it impossible for fish to use the oxygen absorbed in the blood and needed for releasing of energy during respiration (Singer and Ramsay 1994, Finlayson et al. 2000). To reach most tissues in an animal rotenone must first be absorbed into the bloodstream. Ingestion of rotenone has a relatively minor effect on land animals because the enzymes and acids of the digestive system break it down before entering the blood stream. Rotenone persistence in natural waters varies from a few days to several weeks depending on the season. The half-life of rotenone is longest in winter but may decrease to as little as a few hours in summer (Ling, 2003).

Mammalian acute oral toxicity LD50 (lethal dose for 50% of individuals) for rotenone range from 39.5mg/kg for female rats to 1,500 mg/kg for rabbits. For most lab mammals, rotenone is much more toxic when introduced intravenously (0.2 mg/kg LD50) or inhaled rather than taken orally. Efficient breakdown of rotenone by the liver, oxidation of rotenone in the gut, and slow absorption in the stomach and intestines account for this significant difference in toxicity (Narongchai et al. 2005, Ling 2003). Rotenone is highly toxic to fish, with 24 hour LC50 values commonly between 5 and 100 µg/L (micrograms/liter) (Ling, 2003).

Rotenone has a very low toxicity to wildfowl, and birds are extremely unlikely to be affected by 'normal' usage in fisheries management practices (Ling, 2003). Avian acute toxicity LD50 values range from 130mg/kg for the nestling English song sparrow (Cutkomp 1943) to 2200mg/kg for an adult mallard duck (USEPA 1988). In general, young birds are about 10 times more sensitive to rotenone poisoning (CDFG 1994) and, like mammals, birds have a much-reduced tolerance to rotenone when it is introduced intravenously. Ling (2003) also examined rotenone poisoning and sub lethal toxicity in birds as a result of consuming fish or even fish management baits. Ling concluded that "rotenone is slightly toxic to wildfowl, and birds are extremely unlikely to be affected by normal fisheries management programmes." For example, baits used to kill carp for management purposes have around 0.01 g of rotenone each. Ling calculated that a duck would need to consume approximately 200 baits to receive a fatal dose. It is very unlikely that birds would consume baits but they could consume fish killed by rotenone. The concentration of rotenone in poisoned fish is usually 25,000 times lower than that found in baits (Devault, 2013).

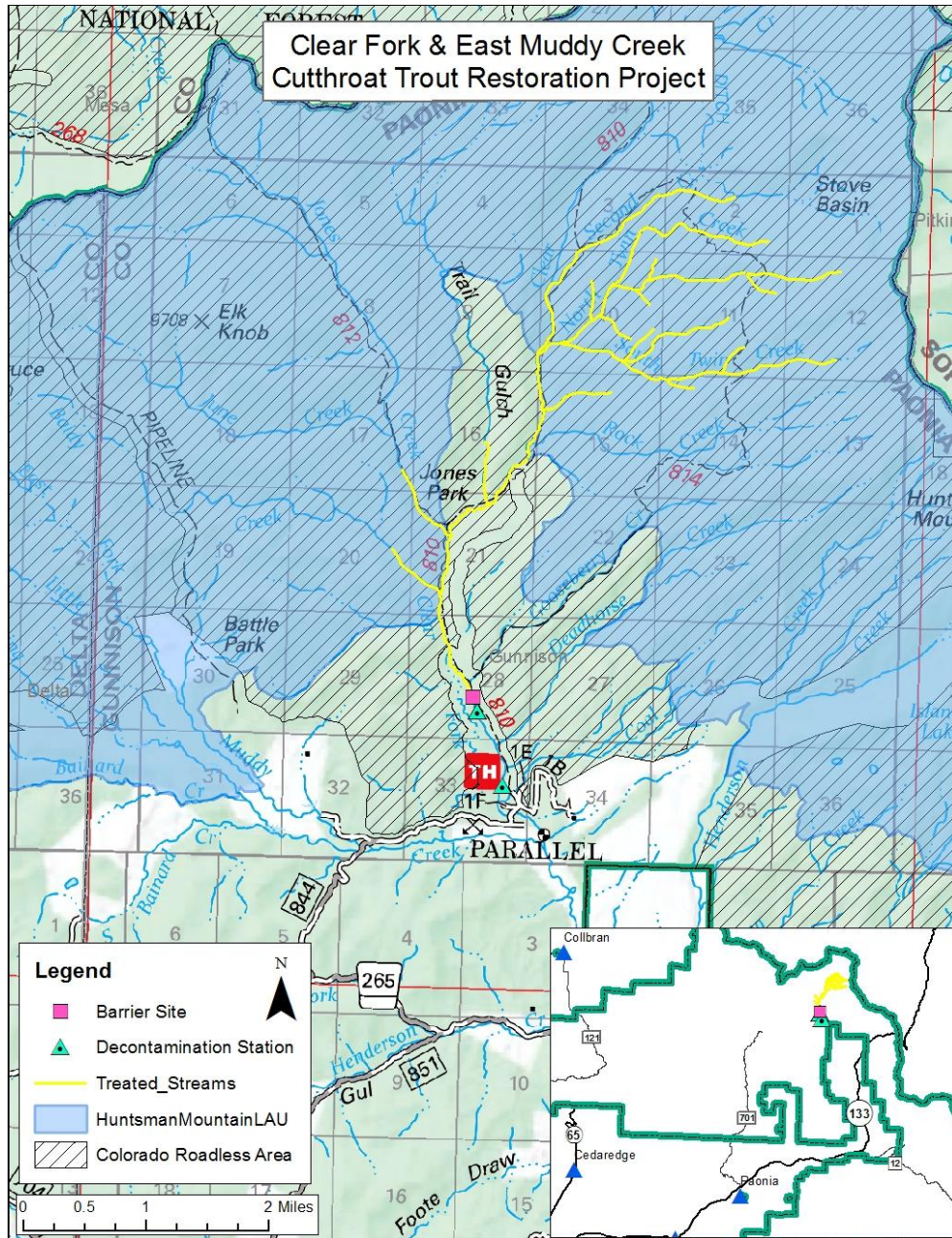


Figure 1: Fish Barrier location shown just outside of Huntsman Mountain Lynx Analysis Unit and Habitat type.

Table 1. Species that are not analyzed further

<p>Listed and Proposed Species</p> <p>The following listed or proposed species or designated critical habitats are neither known or expected to occur in the project area, nor expected to be directly or indirectly affected by the project. As a result, no effect is expected to these listed or proposed species and effects to them are not analyzed further:</p> <p>All species <input type="checkbox"/></p> <p>All species except those listed below and analyzed in Section II <input checked="" type="checkbox"/></p>
<p>The following listed or proposed species or designated critical habitat is known or expected to occur or may be affected by the project and are analyzed further. Proceed to Section II with these species.</p> <p><u>List species here:</u> Yellow-billed Cuckoo <i>Coccyzus americanus</i> Canada Lynx <i>Lynx canadensis</i></p>
<p>Regional Forester's Sensitive Species</p> <p>The following sensitive species are neither known or expected to occur in the project area, nor expected to be directly or indirectly affected by the project. As a result, no impact is expected to these sensitive species and impacts to them are not analyzed further:</p> <p>All species <input type="checkbox"/></p> <p>All species except those listed below and analyzed in Section II <input checked="" type="checkbox"/></p>
<p>The following sensitive species are known or expected to occur in the project area or may be affected by the project and are analyzed further. Proceed to Section II with these species.</p> <p><u>List species here:</u> Olive-sided Fly Catcher <i>Contopus cooperi</i> Purple Martin <i>Progne subis</i> Fringed Myotis <i>Myotis thysanodes</i> Hoary bat <i>Lasiurus cinereus</i> Pygmy Shrew <i>Sorex boyi</i> Spotted bat <i>Euderma maculatum</i> Flammulated owl <i>Psiloscops flammeolus</i> Lewis's woodpecker <i>Melanerpes lewis</i> Northern goshawk <i>Circus cyaneus</i></p>

Biological Evaluation for Categorical Exclusion
Section II – Analysis and determination of effect

Table 2. Identification of habitat and analysis of impacts

Listed and Proposed Species carried forward from Section I		
For each species carried forward from Section I, briefly identify and describe all occupied and unoccupied habitat as it relates to recovery and summarize how the proposed action may directly, indirectly, or cumulatively affect the species or their occupied habitat, or unoccupied habitat required for recovery		
Species	Habitat description	Summary of potential effects from proposed action on species or habitat
Yellow-billed Cuckoo <i>Coccyzus americanus</i> (Western US DPS only)	Yellow-billed cuckoos in the west prefer desert riparian woodlands comprised of willow, Fremont cottonwood (<i>Populus fremontii</i>), alder (<i>Alnus</i> sp.), walnut (<i>Juglans</i> sp.), box elder (<i>Acer negundo</i>), and dense mesquite (<i>Prosopis</i> spp.). Nests most frequently placed in willows, but cottonwoods used extensively for foraging. They prefer patches of riparian habitat >200 acre in size and at least 100 yds in width (Wiggins 2005b).	The yellow-billed cuckoo is uncommon in Colorado even in prime habitat. There aren't expected to be any direct effects to this species. The riparian corridor where the project area is located is composed of aspen, Gambel's oak, and Engelmann spruce and it is unlikely to nest here (). Indirect effects include some noise pollution and minor temporary disturbance associated with implementation of the proposed action and would result in temporary displacement of individuals if they happened to be present in the area. Cumulative effects are not expected to add additional impacts of the proposal that would cause measurable effects to this species. These other activities include: grazing, hunting, public use of the Clear Fork Horse Trail, and administrative use of the road to the project area which is not open to the general public. e. Frogs are a food source among other macroinvertebrates.
Canada Lynx <i>Lynx canadensis</i>	Lynx and snowshoe hares are strongly associated with moist, cool, boreal spruce-fir forests with lots of debris, in young regenerating or mature multi-storied forests with early successional areas and dense understory vegetation that provides food and cover (Ruediger et al. 2000, CPW 2018).	The fish barrier is not within any of the LAUs nor is it in primary or secondary suitable habitat (see fig. 1). Indirect effects could include temporary displacement due to construction activities as the barrier is approximately 1/10 th of a mile from the LAU boundary. Displacement of lynx could also occur when rotenone is applied to Clear Fork, Twin, North Twin, South Twin, and Second creek by individuals with backpack sprayers and the setup and teardown of drip stations. This

Biological Evaluation for Categorical Exclusion

		process is expected to take 2-3 days. All but approximately 0.26 miles of these streams occur within the Huntsman Mountain LAU (#4). No habitat will be impacted as a result of the barrier or the application of rotenone and potassium permanganate. A Biological Opinion from the US Fish and Wildlife Service concurred with a no effect to Canada lynx for the application of rotenone and potassium permanganate.
Regional Forester's Sensitive Species carried forward from Section I		
For each species carried forward from Section, briefly identify and describe all occupied and unoccupied habitat as it relates to maintaining viability on the unit or preventing a trend towards listing and summarize how the proposed action may directly, indirectly, or cumulatively impact the species or their occupied habitat		
Species	Habitat description	Summary of potential impacts from proposed action on species or habitat
Flammulated owl <i>Psiloscops flammeolus</i>	Shows a strong preference for old growth ponderosa pine and Douglas-fir, using older trees for foraging and singing (Reynolds and Linkhart 1992, Linkhart and Reynolds 1997).. Aspen often a component of nesting habitat in Colorado and Nevada (Reynolds and Linkhart 1987b, McCallum 1994b).	Direct effects could include disturbance of nesting owls although there are currently no known nest trees in the project area. Nesting begins in early May and young fledge in July and August (Abele et al., 2004). Indirect effects could include temporary displacement of individuals during construction activities. Cumulatively, these impacts along with those from activities routinely occurring in the project area are discountable given the minor nature of the indirect and direct effects.
Lewis's woodpecker <i>Melanerpes lewis</i>	Breeding and foraging habitat for is characterized by an open canopy, brushy understory, available perch sites and abundant insects excavating in trees that are in advanced stages of decay or using existing cavities.	Direct effects could include disturbance of nesting birds if their nest trees were impacted. There are currently no known nest trees in the project area. Lewis's woodpeckers nest during the months of May through August. Indirect effects could be caused from disturbance associated with construction activities and result in temporary displacement of individuals. Indirect effects could also result in a loss of foraging opportunities as the rotenone could impact some of their food source such as mayflies which could be impacted during the larval stage before emergence. Morrison (1977) states that not all invertebrates would die but

Biological Evaluation for Categorical Exclusion

		would also drift downstream suggesting that there may be an excess of foraging opportunities downstream of the treatment area. These impacts along with those from activities routinely occurring in the project area are discountable given the minor nature of the indirect and direct effects.
Northern goshawk <i>Accipiter gentilis</i>	Nests in a wide variety of forest types including deciduous, coniferous, and mixed forests typically in mature or old-growth types.	There are currently no known nesting goshawks in the project area so direct effects to this species are discountable. Indirect effects from disturbance from construction activities could result in temporary displacement to adjacent suitable habitat. Cumulatively, these impacts along with those from activities routinely occurring in the project area are discountable given the minor nature of the indirect and direct effects. If a goshawk established a nest in the project area, no activities shall be allowed within ¼ mile of an active northern goshawk nest from March 1 to July 31 if they would cause nesting failure or abandonment (USDA Forest Service, 1991).
Olive-sided flycatcher <i>Contopus cooperi</i>	Olive-sided Flycatchers primarily inhabit montane and northern coniferous forests. They may occur at any elevation from sea level to timberline, but usually at mid- to high-elevation forests (3000–7000 ft.). Reported up to 10,000 ft. in subalpine forest of central Colorado (Scott et al., 1982)	Work in this area during breeding season could have direct effects by disrupting a breeding pair if nesting at the site. In Colorado nest building begins as early as June 5, and egg laying occurs between June 16 and July 20 (Bent, 1942). Fledged young have been reported as early as June 23 and as late as August 4 (Kotliar, 2007). Work done outside of these dates would reduce the potential for negative effects. Removal of trees could have an indirect effect by reducing nesting and foraging sites. Birds could also be temporarily displaced during construction activities and application of rotenone to streams. Indirect effects could also result in a loss of foraging opportunities as the rotenone could impact some of their food source such as mayflies which could be impacted during the larval stage before emergence. Morrison (1977) states that not all invertebrates

Biological Evaluation for Categorical Exclusion

		would die but would also drift downstream suggesting that there may be an excess of foraging opportunities downstream of the treatment area. Cumulatively, these impacts along with those from activities routinely occurring in the project area are discountable given the minor nature of the indirect and direct effects.
Purple Martin <i>Progne subis</i>	In the Colorado Rockies, purple martins nest and forage in aspen) forests along edges of beaver ponds or other standing water near large forest openings or meadows.	Potential habitat does occur near the project area and within 1000 feet of the barrier location. There are no known nests in this location. Purple Martins begin nest building mid-April, breeding is complete by mid-June. Post breeding migration begins after fledglings have left, late July to mid-Sept (Wiggins, 2005). Entering the project area after mid Sept. would reduce these potential direct effects. Temporary displacement would be an indirect effect on these birds. Indirect effects could also result in a loss of foraging opportunities as the rotenone could impact some of their food source such as mayflies which could be impacted during the larval stage before emergence. Morrison (1977) states that not all invertebrates would die but would also drift downstream suggesting that there may be an excess of foraging opportunities downstream of the treatment area. Cumulative effects will depend on the number of trees removed during the project and would depend on future projects and the use, the oil pad and admin road get each year. This project will contribute very little to cumulative effects if trees are avoided.
Hoary Bat <i>Lasiurus cinereus</i>	Deciduous and coniferous forests and woodlands, including areas altered by humans. Foraging habitat includes various open areas, including spaces over water and along riparian corridors.	Direct effects could include disturbance to roost sites in deciduous or coniferous trees if bats were present and trees were removed or disturbed. These effects are likely to be indirect and cause temporary displacement to adjacent habitat from noise disturbance. Indirect effects could also result in a loss of foraging opportunities as the rotenone could impact some of their food source such

Biological Evaluation for Categorical Exclusion

		as mayflies which could be impacted during the larval stage before emergence. Morrison (1977) states that not all invertebrates would die but would also drift downstream suggesting that there may be an excess of foraging opportunities downstream of the treatment area. Cumulatively, these impacts along with those from activities routinely occurring in the project area are discountable given the minor nature of the indirect and direct effects.
Spotted bat <i>Euderma maculatum</i>	Various habitats from desert to montane coniferous stands including open ponderosa pine, pinyon-juniper woodland, canyon bottoms, riparian and river corridors, meadows, and open pasture.	There are not expected to be any direct effect to this species given the low impact to habitat and adjacent habitat to project area. Indirect effects could include temporary displacement due to disturbance from construction activities. Indirect effects could also result in a loss of foraging opportunities as the rotenone could impact some of their food source such as mayflies which could be impacted during the larval stage before emergence. Morrison (1977) states that not all invertebrates would die but would also drift downstream suggesting that there may be an excess of foraging opportunities downstream of the treatment area. Cumulatively, these impacts along with those from activities routinely occurring in the project area are discountable given the minor nature of the indirect effects.
Fringed Myotis <i>Myotis thysanodes</i>	<i>Myotis thysanodes</i> appear to use a fairly broad range of habitats. Mature forests with snags in ponderosa pine, PJ forests, or oak and aspen at middle elevations (3000 to 7000 ft) (Keinath 2004).	With the elevation of the fish barrier being approximately 8,100 feet, it possible this species could occur in the area given its association with mixed-conifer and aspen. The removal of snags from transporting or getting the excavator to the work sight, could have direct effects if done during roosting season, which is late April to late September and only if these bats are utilizing the snags. There would be indirect effects if done during hibernation periods, October through April and only if the bats are utilizing the area to roost, because it would

Biological Evaluation for Categorical Exclusion

		displace them the following seasons. Indirect effects could also result in a loss of foraging opportunities as the rotenone could impact some of their food source such as mayflies which could be impacted during the larval stage before emergence. Morrison (1977) states that not all invertebrates would die but would also drift downstream suggesting that there may be an excess of foraging opportunities downstream of the treatment area. Cumulatively, these impacts along with those from activities routinely occurring in the project area are discountable given the minor nature of the indirect and direct effects.
Pygmy Shrew <i>Sorex boyi</i>	Pygmy Shrews inhabit wet conifer forests, upper montane & sub-alpine landscapes, dense stream networks that interact with marshes, bogs & other wetlands with dry forests interspersed (Beauvais and McCumber 2006).	Pygmy shrews will nest in cavities already established, they like a lot of debris. Excavating in the area could have negative or positive direct effects by damaging or producing dwellings. Removal of dead, down trees or tree stumps could have negative direct effects. Indirect effects would include temporary displacement during the project. This project would contribute to the cumulative effects minimally if at all, and would depend on the use of trail 810, the admin road and the oil pad.
Sage Willow <i>Salix candida</i>	Sage willow grows in high pH wetlands and fens.	There are no known locations, but habitat does occur for this species. Direct effects includes trampling associated with chemical treatment along the stream banks and ground disturbance from the barrier installation. Cumulative effects are not expected to add additional impacts of the proposal that would cause measurable effects to this species. These other activities include: grazing, hunting, public use of the Clear Fork Horse Trail, and administrative use of the road to the project area which is not open to the general public.
Dwarf raspberry <i>Rubus arcticus</i>	Dwarf raspberry grows in a variety of environments ranging from dry to moist areas, including mountain meadows,	There are no known locations, but habitat does occur for this species. Direct effects includes trampling

Biological Evaluation for Categorical Exclusion

<i>spp. Acaulis</i>	tundra, bogs and woods. Associated species include Engelmann spruce, willow, currant, horsetail, sedges, and twinberry.	associated with chemical treatment along the stream banks and ground disturbance from the barrier installation. Cumulative effects are not expected to add additional impacts of the proposal that would cause measurable effects to this species.
Slender bristlegrass <i>Eriophorum gracile</i>	Slender bristlegrass grows in fens and subalpine meadows with saturated soils. Associated vegetation is dominated by forbs and graminoids.	There are no known locations, but habitat does occur for this species. Direct effects include trampling associated with chemical treatment along the stream banks and ground disturbance from the barrier installation. Cumulative effects are not expected to add additional impacts of the proposal that would cause measurable effects to this species.
Simple bogsedge <i>Kambresia simpliciuscula</i>	Simple bogsedge grows tundra and alpine climates in wet habitat types (ponds and meadows).	There are no known locations, but habitat does occur for this species. Direct effects include trampling associated with chemical treatment along the stream banks and ground disturbance from the barrier installation. Cumulative effects are not expected to add additional impacts of the proposal that would cause measurable effects to this species.

Table 3. Determination of effect

Listed and Proposed Species carried forward from Section I		
The effects of the proposed action are:	Species	Rationale
No effect	Canada Lynx	The barrier itself is actually not within the LAU. Indirect effects could result from disturbance in application of rotenone to the streams by individuals with backpack sprayers and drip station setup and to a lesser degree by construction of the barrier. This impact will be short term and low impact.
	Yellow-billed	Extremely

Biological Evaluation for Categorical Exclusion

No effect.	Cuckoo	Uncommon and the size of this project is < 1 ac. A yellow-billed cuckoo would most likely only be present incidentally as the habitat quality is low for this species.
May affect, likely to adversely affect		
Regional Forester's Sensitive Species carried forward from Section I		
The impacts of the proposed action are:	Species	Rationale
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Flammulated owl	Impacts are indirect, short term, and low impact.
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Lewis's woodpecker	Impacts are indirect and could cause displacement from disturbance and less foraging opportunities.
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Northern goshawk	Impacts are indirect, short term, and low impact.
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Olive-sided flycatcher	Impacts are indirect and could cause displacement from disturbance and less foraging opportunities.
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Purple martin	Impacts are indirect and could cause displacement from disturbance and less foraging opportunities.
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Hoary Bat	Impacts are indirect and could cause displacement from disturbance and less foraging opportunities.
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Spotted Bat	Impacts are indirect and could cause displacement from disturbance and less foraging opportunities.
	Fringed	Not typically found

Biological Evaluation for Categorical Exclusion

May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Myotis	Roosting in Aspen and this site is just out of its preferred elevation range.
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Pygmy Shrew	The excavating may disrupt litter and ground habitat but may also provide in ground cavities & the diversion built from this project may temporarily provide additional ground moisture.
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Sage Willow	The only ground disturbance will be for the barrier installation and a small amount of trampling during the rotenone implementation by individual people. No temporary roads will be constructed.
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Dwarf Raspberry	The only ground disturbance will be for the barrier installation and a small amount of trampling during the rotenone implementation by individual people. No temporary roads will be constructed.
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.	Slender bristlegrass	The only ground disturbance will be for the barrier installation and a small amount of trampling during the rotenone implementation by individual people. No temporary roads will be constructed.
May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor	Simple bogsedge	The only ground disturbance will be

Biological Evaluation for Categorical Exclusion

cause a trend toward federal listing.		for the barrier installation and a small amount of trampling during the rotenone implementation by individual people. No temporary roads will be constructed.
Beneficial impact (net beneficial)		
Likely to result in a loss of viability in the Planning Area, or in a trend toward federal listing		

Section III – Recommendations for dealing with adverse effects

Optional recommendations by the qualified biologist of options to reduce negative effects/impacts of the project aimed at helping achieve, maintain, or restore project eligibility for CE – **These recommendations should be collaboratively developed, ideally during the Plan to Project phase, with the responsible official and other specialists**

Table 4. Recommendations for removing, avoiding, or compensating for any adverse effects and notes for particular species

Species	Recommendation / notes
All bird species	Beginning work in mid-August would eliminate indirect impacts to bird species albeit these impacts are relatively low.
Pygmy Shrew	Avoid areas with heavy litter and moist ground. Avoid dead down trees as well as old trunks and dried trunks still attached to the ground during barrier installation

Section IV – References

References of informal consultation, contacts, contributors, sources of data, and literature used in developing this BE

Abele, S.C., V.A. Saab, and Garton E.O. (2004). Lewis's Woodpecker (*melanerpes lewis*): A Technical Conservation Assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5182072.pdf [Accessed 07/13/2020].

Beauvais, G.P. and J. McCumber. (2006, November 30). Pygmy Shrew (*Sorex hoyi*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5181918.pdf or <http://www.fs.fed.us/r2/projects/scp/assessments/pygmyshrew.pdf> [12/23/2019].

Bent, A. C. (1940). Life histories of North American cuckoos, goatsuckers, hummingbirds, and their allies. United States National Museum Bulletin 176.

Changed Conditions

- Bent, A. C. (1942). Life histories of North American flycatchers, larks, swallows, and their allies. United States National Museum Bulletin 179.
- Burns, F. L. (1915) Comparative periods of deposition and incubation of some North American birds. Wilson Bulletin 27:275-286.
- CDFG. 1994. Rotenone Use for Fisheries Management-July 1994. Final Programmatic Environmental Impact Report (Subsequent).
- Colorado Parks and Wildlife, Learn Pages, for Colorado Wildlife, Mammals [Online] Available at: <https://cpw.state.co.us/learn/Pages/Mammals.aspx> [Accessed 10/29/2018]; Lynx Reintroduction Program [Online] Available at: <http://cpw.state.co.us/learn/Pages/SOC-LynxResearch.aspx> [Accessed 10/23/2018]
- Cutkomp, L.K. 1943. Toxicity of rotenone and derris extract administered orally to birds. Journal of Pharmacology and Experimental Therapeutics 77: 238.
- Devault, B., S. Coleman, WhiteTrifafaro L. 2013. Supplement to the Environmental Assessment for an Apache Trout Enhancement Project: Considerations for Addition of CFT Legumine™ (Rotenone) and Sodium Permanganate treatments to the Previous NEPA Decision of 2004. Apache Sitgreaves National Forests and the Arizona Game and Fish Department.
- Finlayson, B.; Schnick, R.; Cailteux, R.; Demong, L.; Horton, W.; McClay, W.; Thompson, C.; Tichacek, G. 2000. Rotenone Use in Fisheries Management: Administrative and Technical Guidelines. American Fisheries Society, Bethesda, Maryland.
- Gaines, D. (1974). Review of the status of the Yellow-billed Cuckoo in California: Sacramento Valley populations. Condor 76:204-209.
- Gilligan, J., D. Rogers, M. Smith, and A. Contreras (1994). Birds of Oregon: Status and Distribution. Cinclus Publications, McMinnville, OR, USA.
- Hamilton III, W. J. and M. E. Hamilton. (1965). Breeding characteristics of Yellow-billed Cuckoos in Arizona. Proc. Calif. Acad. Sci. 32:405-432.
- Howe, W. H. (1986). Status of the Yellow-billed Cuckoo (*Coccyzus americanus*) in New Mexico. Santa Fe: N. M. Dep. Game Fish
- Jauvin, D. (1996). "Yellow-billed Cuckoo." In the breeding birds of Quabec: atlas of breeding birds of southern Quebec., edited by J. Gauthier and Y. Aubry, 582-583. Montréal: Association Québécoise des Groupes d'Ornithologues, Province of Quebec Society for the Protection of Birds, Can. Wildl. Serv., Environ. Can.
- Keinath, D.A. (2004, October 29). Fringed Myotis (*Myotis thysanodes*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5181913.pdf or <http://www.fs.fed.us/r2/projects/scp/assessments/fringedmyotis.pdf> [12/12/2019].

Changed Conditions

- Kotliar, N.B. (2007, February 20). Olive-sided Flycatcher (*Contopus cooperi*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/olivesidedflycatcher.pdf> [07/13/2020].
- Ling, 2003. Rotenone a review of its toxicity and use for fisheries management. Science for Conservation 211. January 2003, New Zealand Department of Conservation.
- Linkhart, B. D. and R. T. Reynolds. 1997. Territories of flammulated owls (OTUS FLAMMEOLUS): is occupancy a measure of habitat quality? Pages 150-154 in J.R. Duncan, D.H. Johnson, and T.H. Nicholls, editors. Biology and conservation of owls in the Northern Hemisphere. USDA Forest Service General Technical Report, GTR NC-190, St. Paul, MN.
- Mengel, R. M. (1965). The Birds of Kentucky. Ornithological Monographs 3. American Ornithologists' Union, Washington, DC, USAMcCallum, D. A. 1994. Review of technical knowledge: flammulated owls. Pages 14-46 in G. D. Hayward and J. Verner, editors. Flammulated, boreal and great gray owls in the United States: a technical conservation assessment. USFS General Technical Report, GTR RM-253, Fort Collins, CO.
- Morrison, B.R.S. 1977. The effects of rotenone on the invertebrate fauna of three hill streams in Scotland. Fisheries Management 8: 128-138.
- Narongchai P., S. Narongchai, and Thampituk S. 2005. The first fatal case of Yam bean and Rotenone toxicity in Thailand. Journal of the Medical Association of Thailand. 88(7): 984-7.
- Peck, G. K., and R. D. James (1983). Breeding Birds of Ontario: Nidology and Distribution Volume 1: Nonpasserines. Royal Ontario Museum, Toronto, Ontario, Canada.
- Potter, E. F. (1980). Notes on nesting Yellow-billed Cuckoos. Journal of Field Ornithology 51:17-29
- Reynolds, R.T., and B.D. Linkhart. 1987b. The nesting biology of flammulated owls in Colorado. Pages 239-248 in R.W. Nero, R.J. Clark, R.J. Knapton, and R.H. Hamre, editors. Biology and conservation of northern forest owls. USDA Forest Service, Gen. Tech. Rep. RM-142.
- Reynolds, R.T., and B.D. Linkhart. 1992. Flammulated owls in ponderosa pine: evidence of preference for old growth. Pages 166-169 in M. R. Kaufmann, W. H. Moir and R. L. Bassett, technical coordinators. Old Growth forests in the Southwest and Rocky Mountain Regions. USDA Forest Service General Technical Report, GTR RM-213, Fort Collins, CO.
- Ruediger, Bill, Jim Claar, Steve Gniadek, Bryon Holt, Lyle Lewis, Steve Mighton, Bob Naney, Gary Patton, Tony Rinaldi, Joel Trick, Anne Vandehey, Fred Wahl, Nancy Warren, Dick Wenger, and Al Williamson. 2000. Canada lynx conservation assessment and strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142 pp.
- Singer, T.P.; Ramsay, R.R. 1994. The reaction site of rotenone and ubiquinone with mitochondrial NADH dehydrogenase. Biochimica et Biophysica Acta 1187: 198-202.

Changed Conditions

Skaar, D.R., J.L. Arnold, T.M. Koel, M.E. Ruhl, J.A. Skorupski, and Treanor, H.B. 2017. Effects of Rotenone on Amphibians and Macroinvertebrates in Yellowstone. *Yellowstone Science* 25(1).

USDA Forest Service (USFS). 1991. Amended Land and Resource Management Plan. Grand Mesa, Uncompahgre, and Gunnison National Forests.

USEPA. 1988. Rotenone. EPA Pesticide Fact Sheet. 10/88. Washington, D.C.

Walters, R. E., and E. Sorenson (1983). Utah bird distribution: Lat/long study. Utah Division of Wildlife Research, Salt Lake City, UT.

Wiggins, D. (2005, March 31). Purple Martin (*Progne subis*): A Technical Conservation Assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5182038.pdf. [07/14/2020]

Wiggins, D. (2005, March 25). Yellow-billed Cuckoo (*Coccyzus americanus*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/yellowbilledcuckoo.pdf> [01/31/2020].